

REMARKS

Claim 1 stands rejected under 35 U.S.C. 102(e) as anticipated by Marschke (U.S. 6,149,751). The examiner has applied the Fig. 7 embodiment of Marschke to show a wrap arm device carrying an idler roll (103) which the examiner finds reads on applicants' contact roller in that it is mounted downstream of the line of initial tangent contact between the liner web and the corrugated medium web press the single face web and medium web against the bonding roll.

This rejection is respectfully traversed and reconsideration is requested in view of the Amendment to claims 1 and 10 and the comments that follow.

As is clear from drawing Fig. 7, the idler roll (103) of Marschke '751 is carried on a wrap arm device (101) in a manner that maintains the roll (103) spaced at all times in its circular arc by a radial distance from the fluted bonding roll (90) such that the roll (103) applies no pressure whatever to press the single face web (100) into contact with the fluted surface (91) of the bonding roll. Further, there is no description whatever in the specification of '751 suggesting such pressure contact. Instead, and referring to the paragraph beginning on line 19 of column 12, it is clearly stated that the radial pressure generated on the glued flute tips is created by web tension and not by any contact between the wrap arm roll (103) against the web (100) and bonding roll (90). Thus, there is no disclosure in Marschke '751 to use a contact roll to lightly press the single face web against the bonding roll to spread the adhesive before gelatinization of the starch based adhesive.

Claims 1 and 11 have both been amended to emphasize these features and, as a result, both claims are believed to be allowable over Marschke '751.

Claims 1-3 and 5-12 stand rejected under 35 U.S.C. 103(a) as unpatentable over Isowa (GB 2,308,392) in view of Osgood (U.S. 3,919,029). Isowa is cited for teaching a single face corrugated sheet making machine that includes first and second corrugating rolls, a pasting mechanism for pasting the crest portions of the corrugated paper web, and two pressure rolls (34, 36) which are disposed on the outer surface of the

second corrugating roll (14) to press and stick a liner (26) to the core paper web, reference being made to the drawing figures and page 9, lines 5-34, of the specification. The examiner finds that the second pressure roll (36) reads on applicants' claimed contact roll as it is mounted downstream of the line of initial tangent contact of the liner web and acts to press the liner web against the corrugating roll (14). Isowa is thus found to teach all the limitations of claim 1 except for disclosing that the corrugating roll (14) is heated.

Osgood cited for its teaching of the use of heated corrugating rolls (column 3, lines 41-43). The examiner thus finds it would have been obvious to one of ordinary skill in the art to heat the corrugating roll (14) of Isowa as taught by Osgood to aid in the shaping of the core web and in providing heat to the bonding adhesive.

This rejection is also respectfully traversed in view of the amendments to independent claims 1 and 10 and the comments which follow.

As discussed in the background of the invention in applicants' specification, the single facer disclosed by applicants, which is similar to the single facer described in Marschke '751, presents a significant change in construction and method of operation from prior art single facers shown in Isowa and Osgood. Both Isowa and Osgood constitute so-called "pressure roll" single facers which, as discussed by applicants and in Marschke '751, have been found to be unable to handle the manufacture of single face corrugated web under today's requirements of high speed and lighter weight web papers. Pressure roll single facers operate by imposing very high nip loads exerted by a pressure roll (34 in Isowa and 30 in Osgood) against the freshly glued single face web carried on one of the corrugating rolls (14 in Isowa and 20 in Osgood). As indicated by applicants and by Marschke '751, the high loads exerted by pressure rolls on the freshly glued single face web squeeze the starch based adhesive almost completely from the interface between the corrugated medium web flute tips and the surface of the liner web. Instead, high load pressure roll single facers relied on an initial mechanical bond to hold the composite single face web together until the starch based adhesive can gelatinize and, as higher temperatures are applied, move into the stronger "green bond" stage. For example, Osgood discloses a pressure roll loading of 186 pounds per lineal inch along the full axial

lengths of the pressure roll (30) against the corrugating roll (20). The term "pressure roll" has attained a well-known meaning in the prior art such that when the same term is used in Isowa, it is clear that Isowa is also describing a high nipping pressure between the first pressure roll (34) and the corrugating roll (14). Another characteristic of prior art pressure roll single facers is that the two corrugating rolls and the pressure roll are in substantial alignment such that their axes are coplanar or nearly coplanar. In Osgood, the corrugating rolls (18, 20) and the pressure roll (30) appear to be in direct alignment. In Isowa, corresponding rolls (12, 14) and (34) are also in substantial alignment, although the Fig. 9 embodiment shows a small angular offset of the pressure roll (34). Nevertheless, the three rolls (12, 14 and 34) are in substantial alignment, primarily so the high nipping force and can also be utilized to help control axial roll deflection, as discussed in Osgood (column 1, lines 41-48).

As indicated, the subject single facer, like Marschke '751, represents a significant departure in single facer construction, primarily by having completely eliminated the use of a pressure roll. Elimination of the pressure roll immediately eliminates one of the problems in prior art single facers, namely, squeezing the freshly applied adhesive from the glue lines right at the flute tips. In addition, the subject invention recognizes that some light contact to assist in spreading the glue lines before the starch adhesive begins to gelatinize is very important. If the glue lines are not properly spread before gelatinization, the desired optimized glue lines may simply not form at all. The pressure by which the contact roll lightly presses the glued single face web 16 against the surface of the bonding roll 12 is only about five pounds per lineal inch (page 5, lines 32-33). This is substantially less than high loads imposed by pressure rolls, such as the 186 pounds per lineal inch disclosed in Osgood.

Even in Isowa where two pressure rolls (34, 36) are used, "the total sum of the nipping pressure of both pressure rolls 34, 36 is set in a range where the same is almost equivalent to the nipping pressure in a case where a single pressure roll is used" (page 10, last line, to page 11, first line). Furthermore, both of the pressure rolls (34, 36) in Isowa are heated by high temperature steam "whereby the gelling of starch-based paste

is promoted" (page 10, lines 5-6). As pointed by the examiner with reference to Osgood, the corrugating rolls may also be heated. These arrangements result in two problems. First of all, the high nipping pressure of the pressure rolls (34 in Isowa and 30 in Osgood) squeeze the starch adhesive from the interfaces between corrugated medium flute crests and the interface with the liner web. With respect to those regions, there is simply little or no starch to gelatinize. The use of a second pressure roll (36) in Isowa does nothing to correct the deficiencies or to suggest the important features of applicants' apparatus and method. The first pressure roll (34) of Isowa will have already damaged the glue line and the additional travel of the heated web around approximately one-quarter of the circumference of the corrugating roll (14) will likely have caused the adhesive to gelatinize before it reaches the second pressure roll (36) as taught by Isowa.

In applicants' apparatus and method, the light contact provided by contact roll 18 spreads the fresh starch adhesive without causing it to be squeezed from the flute tips before gelatinization of the adhesive occurs as the single face web progresses around the bonding roll 12. These important features are more clearly brought forth in amended claims 1 and 10.

With respect to claim 2, applicants concede the variable positioning of the pressure roll (36) taught by Isowa. However, claim 2 is believed to be allowable along with amended claim 1.

Claims 3 and 7-9 set forth details of the construction of the contact roll 18 which are not shown in any of the cited prior art. Thus, claims 3 and 7 are believed to be allowable as filed, but are clearly allowable along with amended claim 1 from which they depend.

Claims 4-6 depend from claim 1 and, although these claims recite features which the examiner has found to be obvious in view of the teachings of Osgood and Araki (U.S. 6,476,151), these claims are also believed to be allowable along with claim 3 from which they depend.

Claim 11 recites a preferred level of the light force provided by applicants' contact roll which, as indicated above, is many times lower than the loads imposed by the

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prior art pressure roll single facers. This claim is believed to be allowable along with amended claim 10.

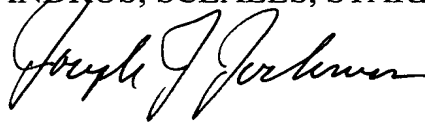
Claim 12 has been cancelled.

Claim 13 is believed to be allowable along with amended claim 10 from which it depends.

For all of the foregoing reasons, amended claims 1-11 and 13 are believed to be in condition for allowance and further favorable action is respectfully requested.

Respectfully submitted,

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